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SMART GATOR: ***AN ANALYSIS OF THE IMPACT OF REDUCED MANNING ON THE MISSION READINESS OF U. S. NAVAL AMPHIBIOUS SHIPS***

By

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The increasing cost of manpower in the United States Navy and the decline of the defense budget generated a new initiative called the Smart Ship Program. Smart Ship, using a combination of technology and nontraditional policies and procedures to reduce manning on U.S. naval vessels, was first implemented on the USS Yorktown (CG 48). However, some of the technology and concepts were not readily transferable to other ship classes. The USS Rushmore (LSD 47) was chosen to implement and evaluate Smart Ship concepts on an amphibious ship through the Smart Gator Program. This thesis evaluated the impact of Smart Gator on the mission readiness of the Rushmore by conducting interviews with key Smart Gator Program personnel, reviewing pertinent data and analyzing the Rushmore's Engineering Certification Report of October 1998. This study shows that the initial reduction in manpower, combined with increased training required on new equipment, produced an increase in the crew's workload and negatively impacted mission readiness. Additionally, the interviews indicate that Navy research and development funds should be dedicated to this effort in order to properly execute the Smart Gator Program.

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SMART GATOR: *AN ANALYSIS OF THE IMPACT OF REDUCED MANNING ON THE MISSION READINESS OF U.S. NAVAL AMPHIBIOUS SHIPS*

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ABSTRACT

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I. INTRODUCTION

A. PROBLEM

Commanding Officers of Navy ships have dealt with the issues of proper manning and mission readiness for centuries. The mission readiness of any sea-going vessel requires that each person onboard be skilled in a wide variety of maritime duties, including routine watchstanding, planned and corrective maintenance, basic housekeeping, and most importantly, damage control. Aboard United States Navy vessels, every crewmember has multiple responsibilities based on the ship's operating environment. Maximum readiness to operate in any given environment can only be achieved by conducting quality training, and by having sufficient personnel to safely carry out assigned tasks for the duration of the operation.

Although technological advancement has drastically improved the capabilities and living conditions of Navy vessels over the years, the optimum number of personnel per vessel remains a delicate issue that has been amplified in the post-Cold War era. Operators assigned to ships constantly seek ways to enhance mission readiness and

quality of life, which is primarily achieved by increasing the number of qualified personnel onboard through training.

However, a ship must first have a sufficient number of personnel to conduct training. Unfortunately, shrinking budgets have forced the Navy to reduce operating costs by reducing manning, since the active duty military personnel Navy (MPN) budget constitutes 20 percent of the Department of the Navy total, and is its second largest appropriation. [Ref. 1] This conflicts with the orientation of operators towards redundancy in every critical system and at every critical position.

In spite of budget and personnel issues, Commanding Officers and their crews continue to carry out assigned missions with apparent ease. However, the reduction in forces has taken its toll. As President Reagan's initiative for a 600-ship Navy in the early 1980's has been effectively cut in half, the number of contingencies requiring U.S. Navy presence has steadily increased. Unrest in Bosnia, Somalia, West Africa, Haiti, Korea and the Persian Gulf over the last five years has stretched the fleet significantly. This statement from the Navy's 1998 Posture Statement captures the result:

"Although the incremental costs for contingency operations are relatively small due to our forward presence, we must still divert programmed operations, maintenance, and training funds away from non-deployed forces to support such requirements." [Ref. 2:Ch 5]

These changes have had a direct impact on quality of life, which is generally defined by the number of working hours and the amount of time spent away from home. Navy recruiting and retention have decreased over the past few years as a result. [Ref. 2:Ch 4] Unfortunately, in the post-Cold War era, the shrinking defense budget requires a policy of reduced operating costs while maintaining mission readiness; thus doing more with less has become the accepted rule.

B. BACKGROUND

Before the 1970's, the cost of manpower was a comparatively small part of the Navy's annual budget. With the advent of the all-volunteer force (AVF) in 1973, military pay began to rise in an attempt to recruit young Americans with pay equivalent to the civilian sector. There were no alternatives; pay had to increase to meet the demand

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B. BACKGROUND

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of force structure required to operate a growing Department of Defense. [Ref. 3:p. 6]

However, even with increased pay, recruitment continued to be a problem. Many operational units experienced shortfalls in the mid-level petty officer ranks. These were the ranks that maintained the knowledge base for maintenance and operation throughout the fleet. By 1980, there was a shortage of some 23,300 Petty Officers and retention was only 50.5 percent for second-termers. [Ref. 4:p. 152] It was not until President Reagan gained office in 1981 that military pay, benefits and retention began to rebound. Under President Reagan and Secretary of the Navy, John Lehman, the U.S. Navy developed and implemented a plan for a 600-ship Navy. [Ref. 5:p. iii] The Navy needed to increase manpower in order to meet the requirements of the larger fleet.

In the early 1990's, Admiral Boorda realized manpower was not being used effectively throughout the fleet. "For my entire thirty-nine year career, we always talked about buying ships and manning them with people...I think we need to think about things differently now. We need to figure out how to have the fewest number of people possible, and

then build [ships] to make them as effective as they need to be." [Ref. 6:p. 21] After the completion of a study by the Naval Research Advisory Committee, Admiral Boorda requested a test platform to examine and validate recommendations for manpower reductions on a surface combatant. [Ref. 6:p. 83]

As a result of the study and Admiral Boorda's interest, the Smart Ship Project was initiated in 1995, and hundreds of technological ideas to reduce manpower were forwarded to Washington, D.C. [Refs. 7, 8] Many focused on the procedures of the merchant fleet. The USS Yorktown (CG 48) was chosen as the pilot platform for the Navy in November 1995. [Ref. 9] Since the Yorktown is a cruiser, some of the new technologies, policy changes and equipment installations were not readily transferable to amphibious ships.

Consequently, in the fall of 1996, Commander Naval Surface Forces Pacific (SURFPAC) and Naval Sea Systems Command (NAVSEA) initiated the Smart Ship Program aboard the amphibious dock landing ship, USS Rushmore (LSD 47). [Ref. 10] In addition to Smart Ship technologies, NAVSEA also seized the opportunity to test equipment that is being implemented on the 21st century amphibious ship, USS San Antonio (LPD-17). Thus the program was named Gator-17.

[Ref. 10] For the purposes of this thesis the program will be referred to as "Smart Gator".

C. OBJECTIVES

The objective of this study is to evaluate the impact of Smart Gator as it pertains to the mission readiness of amphibious ships. The primary question the study will address is:

Has the Smart Gator Program impacted the Required Operational Capability of the USS Rushmore? Subsidiary questions include the following:

1. What significant factors were considered prior to initiating the Smart Gator Program on USS Rushmore?
2. What are the significant difficulties experienced implementing the program?
3. What are the advantages and disadvantages of implementation?
4. How are the routine and special evolution watchteams organized?
5. How are manpower savings determined?

6. Is the Smart Gator effective according to SURFPAC and NAVMAC methodology? How is cost effectiveness determined?
7. Are the current Smart Gator concepts and technical applications working?
8. What alternatives are available for current amphibious ships to reduce manpower?

D. SCOPE AND METHODOLOGY

This study will focus on the impact of the Smart Gator Program on the mission readiness of USS Rushmore and provide recommendations to enhance the implementation of the program on other amphibious ships. Cost-benefit analyses of reduced manning will be limited to studies previously conducted by Commander, Naval Surface Forces Pacific (SURFPAC) and Navy Manpower Analysis Center (NAVMAC). Background studies of the original Smart Ship Project on the USS Yorktown will provide insights on the implementation of Smart Ship on various ship types. Recommendations for future research will also be provided.

E. ORGANIZATION

This thesis will include five chapters. Chapter I defines the problem and provides general background information. Chapter II presents an overview of the Smart Ship Project on USS Yorktown by reviewing past policy attempts to reduce manning and analyzing current objectives and progress.

Chapter III will provide an overview of USS Rushmore's Smart Gator Program, explaining policy and procedural changes as well as related technology. Several initiatives from NAVSEA's Engineering for Reduced Maintenance (ERM) program will also be discussed. Important information relating to Smart Gator will be provided based on interviews with the Commanding Officer and a sample of crewmembers of USS Rushmore, the Smart Gator Program Office at Commander Amphibious Group Three, media reports, the Internet, as well as program-related presentations and documentation.

Chapter IV will analyze the implementation and impact of the Smart Gator Program by reviewing the results of the USS Rushmore's Engineering Certification (E-Cert). [Ref. 22] Chapter V will contain conclusions on the impact of the Smart Gator Program on USS Rushmore and recommendations to

enhance implementation on other amphibious ships. Future applications on the USS San Antonio (LPD-17) and alternative manpower reduction methods will also be discussed. Recommendations for follow-on research will be based on lessons learned with the current program and thesis findings.

II. SMART SHIP

A. INTRODUCTION

For many years, the United States Navy has watched other sea going organizations use technology to reduce manpower on vessels. Commercial freighters often conduct trans-ocean passages with only one watchstander manning the bridge, while the typical U.S. Navy vessel has a minimum of ten personnel on a watchteam. The standard Navy underway bridge watchbill consists of the officer of the deck (OOD), junior officer of the deck (JOOD)/conning officer, quartermaster of the watch (QMOW), boatswain's mate of the watch (BMOW), messenger of the watch (MOW), helmsman, leehelmsman, forward lookout, aft lookout and the signalman of the watch (SMOW). Numerous personnel who stand watches in the combat information center (CIC) and engineering spaces also assist the bridge watchstanders. For safety reasons, this configuration increases in size during special evolutions like anchoring, mooring and underway replenishments.

The Navy's traditional mentality of excellence through redundancy has proven to be effective, if not efficient. The United States has enjoyed maritime dominance for over two hundred years due to the Navy's ability to achieve mission success, regardless of the tasking. However, in the post Cold War era, tradition and culture must give way to technological innovation and new policy implementation.

Smart Ship provides one potential answer for the Navy's maritime manning and mission concerns. It uses common sense approaches, along with commercial off the shelf technology, to reduce manning requirements for watchstations. However, it is difficult to determine the overall effect of reduced manning on a vessel's mission readiness. Fewer crewmembers usually mean more working hours, particularly in the areas of unscheduled, corrective maintenance and emergent repairs that are common to the fleet. Consequently, longer working hours reduces crew rest which directly impacts operational efficiency and mission readiness.

B. PAST POLICY ATTEMPTS TO REDUCE MANNING

Reduced manning is not a new goal. As mentioned, the Navy has benefited from indirect reduced manning in weapon

systems and engineering. On several occasions the Navy has attempted to benefit directly from reduced manning. Three of these attempts occurred in the 1970's. Two were in the construction of new platforms, the Spruance class destroyer (DD 963), and the Oliver Hazard Perry guided missile frigate (FFG 7). The third was in a program similar to Smart Ship today, implemented on the test ship USS McCandless (FF 1084) during the period of November 1976 to January 1977. [Ref. 3:p. 29]

In the development of the DD 963 class, roughly 225 crewmembers were originally assigned. The manning requirements were based on a task analysis of maintenance and watchstanding requirements. However, the Navy quickly realized how minimally armed the warship was, and devised ways to improve its combat power. In addition, the crew had to be increased to meet maintenance requirements and shipboard training. As a result, the present complement is approximately 325-350. [Ref. 3:p. 30]

The Oliver Hazard Perry class frigate was designed under a concept entitled "high mix, low mix." The strategy envisioned the need for highly capable and high cost cruisers and destroyers to serve in areas of severe enemy

threat, while less capable, less costly frigates served in areas of low enemy threat. As a result, the low mix ships received less attention in material condition and maintenance from shore facilities. Crew size was not large enough to complete repairs alone, and combat readiness decreased. [Ref. 3:p. 30]

The ship control function has been viewed by many as an overmanned requirement for decades. Both tradition and decreased training opportunities have continued bridge manning of over ten members per watch. Therefore, manpower is diverted from other tasks such as maintenance and administration in an attempt to keep ship control personnel trained. The integrated bridge system (IBS), a significant part of the Smart Ship technology was evaluated aboard the USS McCandless for a period of three months. It proved that watchstanding manning requirements could be reduced. However, it was not seen as cost effective by Navy leadership. Specifically, there was a higher priority for weapon and sensor development and acquisition. [Ref. 3:p. 30]

Other technological improvements which had the potential to reduce manpower derived from a study by Purdue

University in the 1960's, funded through the Advanced Research Projects Agency (ARPA). The study's purpose was to evaluate the possibility of automating several processes aboard destroyer escorts in an effort to reduce manning. The Purdue University study offered a solution that included adding computer technology aboard. However, the proposal was determined not to be cost effective because the reductions in crewmembers occurred only in the lower paygrades, creating a more top heavy Navy. [Ref. 3:p. 31]

C. SMART SHIP PROJECT

1. Background

In October 1995, the Naval Research Advisory Committee (NRAC) briefed reduced manning concepts applicable to U. S. Navy ships to the Chief of Naval Operations, Admiral Boorda. [Ref. 6] The report revealed no specific laws, with the exception of a requirement for a posted lookout, which required the number of watchstanders Navy ships must maintain. The report also stated that the major obstacle to reduced manning and decreased life cycle costs aboard Navy ships was culture and tradition rather than the lack of proven technology or know-how. The challenge was to demonstrate in an operational ship that reductions in

workload and manpower requirements were possible while maintaining mission readiness and safety. The panel suggested the Navy shift its focus from using technology as a tactical and operational benefit to using it as a means to reduce manpower by improving personnel productivity. [Ref. 6]

With the theoretical studies complete, the reduced manning initiatives needed to be proven at sea. The Commander, Naval Surface Force, U.S. Atlantic Fleet (COMNAVSURFLANT), was designated as the executive agent for the Smart Ship Project and nominated USS Yorktown as the ship in which to implement ideas to demonstrate the concept. [Ref. 7] Prior to Yorktown's approval, it was assigned to a new homeport and to the Western Hemisphere Battlegroup that operated in the Gulf of Mexico. This battlegroup was specifically designed to deploy only four or five months in the Caribbean to deter and track drug operations off the coast of South America. [Ref. 8]

2. Overview

Based on the NRAC findings, the Smart Ship Project team set out to discover ideas to change the way the Navy equips and mans ships. The directives the team received from

Admiral Boorda were to challenge policy, culture, and tradition that contributed to unproductive workload. Boorda also tasked them to incorporate modern and current technology, which could minimize human interface and improve productivity. [Ref. 8]

As a part of the new technology, the Yorktown received a fiber optic local area network (LAN), an integrated bridge system (IBS), a damage control system (DCS), an integrated condition assessment system (ICAS), and a standard monitoring and control system (SMCS). The tactical action officer (TAO) controlled all ship functions from CIC. A fully qualified OOD was stationed on the bridge along with three personnel to ensure safe navigation. [Ref. 8]

However, technology alone was not sufficient to generate the anticipated 10-15 percent manpower reduction that was required to produce a realistic return on investment. Thus, the Smart Ship Project team and the crew of the Yorktown realized that significant savings could best be achieved through the following three initiatives:

(1) Revised policy and procedures

(2) Technology

(3) Improved maintenance methods

D. USS YORKTOWN PROGRESS

1. Manpower reducing initiatives

The Yorktown employed the three manpower reducing initiatives and experienced immediate results. According to the Smart Ship Project Assessment Report from COMNAVSURFLANT to the CNO in September 1997, [Ref. 9] the Yorktown used the following methodology to achieve reductions in workload and manpower requirements:

(a) Revised policy and procedures - Watch stations and other workload were not assigned according to conditions of readiness. An innovative Core Team/Flex Team Watch Organization completely revamped the traditional Condition I-IV manning concepts while significantly reducing the number of people required onboard. The new matrix was based on a "flex to action" philosophy that allowed the watch team to focus on watch-standing responsibilities and delegated routine workload to a "day-worker" force. The components of the matrix were "flexed" as needed to perform necessary functions and relaxed back to a "core team" as the situation allowed. Integral to this new

approach was a dedicated training department with a Learning Resource Center.

(b) Technology - Navigation, machinery control, equipment condition and monitoring, and information management systems were automated. These functions are now performed by commercial off-the-shelf computer equipment, integrated on a fiber optic local area network (asynchronous transfer mode, or ATM LAN). Wireless internal voice communication equipment was used, which allowed instantaneous, multi-channel communication among shipboard personnel.

(c) Improved maintenance methods - Preventive maintenance requirements were established using Reliability Centered Maintenance (RCM) methodology. This improved approach reduced the scheduled preventive maintenance workload by 15 percent. Material condition of Yorktown equipment showed no degradation. Improved corrosion control measures reduced preservation workload for the crew.

2. Results

The COMNAVSURFLANT Smart Ship Project Assessment Report also noted that all policy and procedure, technology, and

maintenance initiatives reduced the total weekly workload by more than 9000 hours (approximately 30 percent). This decrease in workload produced manpower reductions of 44 enlisted and 4 officers, which translated to a total potential annual savings of $2.865 million. [Ref. 9]

When taken separately, technology did not produce a reasonable return on investment. However, some of the individual technologies were critical to the policy and procedure changes. Particularly, the voyage management, wireless internal voice communications, ATM LAN, and machinery condition assessment systems were the cornerstones for establishing new and more efficient procedures. More importantly, these individual technologies, policy changes and maintenance practice changes are readily transferable to any ship, with a minor amount of tailoring. [Ref. 9]

The Yorktown has undergone a demanding assessment of her ability to meet Required Operational Capability/Projected Operational Environment (ROC/POE) requirements since the outset of the Smart Ship Project. The Afloat Training Group (ATG), Propulsion Examination Board (PEB), NAVMAC, and Operational Testing and Evaluation Force (OPTEVFOR) performed numerous independent assessments,

all of which indicated that the Yorktown performed consistently well.

In February 1997, NAVMAC assessed Yorktown in terms of man-hour availability and effective assignment of personnel to watchstations during various evolutions and conditions of readiness. NAVMAC concluded that Yorktown met the spirit of the class ROC/POE, but did not literally comply with the ROC/POE as written, with the variant being watchstanding philosophy. [Ref. 9]

In March 1997, Yorktown was assessed by OPTEVFOR, which concluded that Yorktown demonstrated the ability to execute required operational missions with reduced manpower. OPTEVFOR further recommended continued development, demonstration, test, and evaluation of Smart Ship initiatives. [Ref. 9]

With regards to sustainability, CNSL observed that a primary concern of this assessment is whether the Smart Ship concept is sustainable. Specifically, it must be determined if a smaller crew can sustain the ship and its equipment, as well as itself. The crew must get enough rest, training, and leisure activity in order to perform at its best. Since only a relatively short assessment period was available for

determination of sustainability, the analysis continues. No significant degradations in crew rest or morale have been noticed. [Ref. 9]

Future plans are to install the Smart Ship policy and procedures on a deploying destroyer squadron for evaluation, seek funding for proven technology backfit and forward fit installations, and continue to search for more workload savings via the Smart Ship Project. [Ref. 9] The concepts are also being assessed on the amphibious ship, USS Rushmore and the logistics support ship, USS Rainier (AOE-7). However, unlike the Smart Ship Project on Yorktown, which is fully funded, the type commander, Commander Naval Surface Forces Pacific, funds the latter two efforts.

E. THE BIRTH OF THE SMART GATOR

Until 1996, most of the reduced manning initiatives were attempted aboard combatants, with little regard given to the applicability to amphibious and logistics support ships. Differences in mission and manning requirements indicated that not all Smart Ship concept initiatives were transferable. In the fall of 1996, COMNAVSURFPAC selected the amphibious dock landing ship, USS Rushmore, as its Smart

Ship platform. COMNAVSURFPAC also joined with NAVSEA to test equipment being implemented on the 21st century amphibious ship, USS San Antonio (LPD-17). COMNAVSURPAC named the program "Gator-17," [Ref. 10] but for the purposes of this thesis it will be referred to as "Smart Gator".

III. SMART GATOR

A. INTRODUCTION

1. Background

The naval forces remain the most viable means for the United States to respond rapidly to contingencies around the world. On any given day, one third of the Navy's ships, submarines, squadrons, and Marine units are deployed overseas. [Ref. 1:Ch.5]

However, the end of the Cold War ushered in a new threat that required new strategies. The primary focus shifted from open ocean to near-land missions. The new emphasis for the Navy became amphibious operations, including non-combative evacuation operations, humanitarian assistance and amphibious assaults.

Amphibious ships are designed to carry out this wide range of missions. Huge carrier battlegroups, surrounded by numerous cruisers and destroyers dedicated to anti-air and anti-submarine warfare, have become less important as numerous Third World contingencies dictate a force capable of responding in a littoral environment.

The basic difference between the missions of cruisers, like Yorktown, and amphibious ships, like Rushmore, is that the cruiser delivers missiles while the amphibious ship delivers troops. This inherent difference has always guaranteed further dissimilarities in shipboard manning requirements, equipment and battle bills, which reflect watchstation assignment for shipboard personnel during various states of readiness. Thus, it became necessary to evaluate Smart Ship concepts on an amphibious ship.

2. Chapter overview

Section B of this chapter discusses the Rushmore's Required Operational Capability in the Projected Operational Environment (ROC/POE), and provides insight to amphibious Navy operations. Section C discusses the Smart Gator Program, including information on manpower reduction considerations, the NAVMAC analysis, as well as policy, procedural, and technological changes onboard the Rushmore. Section D provides the numerical results of the Smart Gator Program manpower reduction efforts.

B. THE USS RUSHMORE'S MISSION AND CAPABILITIES

1. ROC/POE

and

The missions, functions and tasks of all United States warships are defined in the ship's Required Operational Capability in the Projected Operating Environment (ROC/POE). The ROC is a mission statement prepared by the warfare sponsor detailing required capabilities in various operational situations. The level of detail sets forth which weapons will be available at varying degrees of readiness (e.g., perform anti-air warfare with maximum capability in condition of readiness I, partial capability in condition of readiness III). The POE is a description of the specific operating environment in which the unit is expected to operate. [Ref. 23:App. B]

2. Mission and capabilities

The Rushmore's mission is to transport Marines and their combat equipment to areas of interest around the world, then launch and support landing craft and helicopters during amphibious operations, as necessary. The Rushmore carries up to four landing craft air cushioned vehicles (LCAC), each capable of carrying a 60-ton payload at speeds in excess of 40 knots. These hovercraft allow the Navy to

conduct amphibious landings on previously inaccessible beaches at distances that once were not operationally feasible.

The Rushmore accomplishes her mission through the use of a 440-foot well deck that is flooded to launch and recover landing craft. A flight deck is also available to launch and land up to two CH-53E helicopters. The Navy's latest combat communication systems, diesel propulsion, engineering technology, and advanced repair facilities make the Rushmore a formidable warship. Complete medical and dental facilities and crew and troop berthings accommodate up to 627 embarked Marines and 345 sailors. [Ref. 15]

C. THE SMART GATOR PROGRAM

The Gator 17 Vision Statement for Calendar Year 98 and Beyond [Ref. 24] provides a detailed synopsis of the Rushmore's intended strategy with regards to the Smart Gator Program. Core installations, other installed items, planned or considered items, equipment removals, and policy and procedural changes, are also included in detail.

Sections C.1 and C.2 below provide background regarding projected manpower reduction and return on investment of the

systems installed. Sections C.3 and C.4 specify policy, procedural, and technological changes of the Rushmore.

1. Determining Manpower Reduction and Return on Investment

a) Shipboard manning

As stated in the Navy's Manpower Manual [Ref. 23], the Navy's manpower requirements provide a dynamic system for planning, programming, and budgeting total force manpower resources to support the operating forces and the shore establishment under peacetime and wartime conditions. The Manpower Manual also establishes manpower requirements through the following programs:

1) Ship Manpower Requirements Determination Program (SMRDP) for Ship Manpower Documents/Fleet Manpower Documents (SMDs/FMDs).
2) Aviation Manpower Requirements Determination Program for Squadron Manpower Documents (SQMDs), carrier air wings (CVWs), Sea Operational Detachments (SEAOPDET) Manpower Documents, afloat aircraft intermediate maintenance departments (AIMDs).

3) Individual Account (IA) for non-force structure manpower. [Ref. 23:p.2]

For the purpose of this thesis, only the Ship Manpower Document determination elements will be addressed. SMD requirements [Ref. 23:p. 2-4] are determined by, but are not limited to, the following development elements:

1) ROC/POE parameters and analysis (Operational manning, wartime missions, functions and tasks).

2) Directed manpower requirements (Master Chief Petty Officer of the Command, Career Counselor, etc).

3) Watch stations.

4) Preventive maintenance.

5) Corrective maintenance.

6) Facilities maintenance.

7) Application approved staffing standards (when applicable).

8) On-site workload measurement and analysis.

9) Utility tasking (Underway replenishment, flight operations, sea and anchor detail, etc).

10) Allowances (service diversion, productivity allowance, etc).

11) Development of officer requirements.

12) Fleet review of draft documents.

Thus, in order to conduct a complete shipboard assessment for manpower reduction, each of the above listed items should first be considered.

b) *The NAVMAC projected manpower reduction and return on investment*

At the outset of the Smart Gator Program, COMNAVSURFPAC requested NAVMAC and the Rushmore conduct a thorough review of the ship's battle bill in order to determine the most likely places for manpower reductions. The total number of enlisted billets saved through policy changes, Smart technology and reduced maintenance would then be multiplied by the workyear rate of $33,391 per enlisted billet. [Ref. 12]

The initial projected savings of 42 enlisted billets were applied to the eight million dollar cost of the "core installation." The core installation included the fiber optic Local Area Network (LAN), the Integrated Bridge System (IBS), the Integrated Condition Assessment System (ICAS), Damage Control Quarters (DCQ), Machinery Control System (MCS), and HYDRA II wireless communications system. The projected savings of 42 billets, multiplied by $33,391

per billet per year, produced a return on investment of $1.4 million per year over a six-year period. [Ref. 12]

2. The NAVMAC Analysis

Although the projected return on investment was very attractive to COMNAVSURFPAC and NAVSEA, the NAVMAC analysis considered only operational manning, which constitutes 25 percent of a sailor's total workload. [Refs. 17, 25] Thus, the projected number of billets and the return on investment were better than they would be if all items were included. The manpower determination items represent a percentage of each crewmember's total workload, and should be considered when establishing any changes in a ship's manning.

Table 1 indicates the distribution of crewmembers' workload activities. Seventeen percent of a sailor's workload is allowed for schools, leave, and other factors that affect productivity. Own unit support for administrative duties and shipboard housekeeping constitutes another twenty percent. Facilities Maintenance, which includes preservation, hull maintenance and repair, constitutes fourteen percent. Training constitutes nine percent, while corrective and planned maintenance combine for fifteen percent. As previously mentioned, operational

manning, which includes underway peacetime watchstanding, constitutes twenty five percent of a sailor's total workload. [Refs. 19, 25]

Essentially, COMNAVSURFPAC and NAVMAC agreed to base manpower reduction calculations on the number of watchstations saved through planned and installed technology, and the Rushmore's Core/Flex Organization. [Refs. 12, 17, 25] Thus, the reduction projections, as well as the return on investment, were impressive to all concerned.

Table 1. Crewmember's workload activity and percent of total workload.

WORKLOAD ACTIVITY	% OF TOTAL WORKLOAD
Allowances	17 percent
Own Unit Support	20 percent
Facilities Maintenance	14 percent
Training	9 percent
Corrective Maintenance	5 percent
Planned Maintenance	10 percent
Operational Manning	25 percent
Total	**100 percent**

Source: USS Rushmore (LSD 47) Gator 17 Manpower Reduction Brief of 7 July 1998 [Ref. 25]

3. Policy and procedural changes

Prior to the implementation of the Smart Gator Program, the Rushmore's battle bill philosophy, administrative procedures, and internal organization were similar to most other ships in the U.S. Navy. Watchstations were manned to react to any circumstance, and watchstanders conducted routine maintenance actions during their off time.

However, the Rushmore currently assigns watchstations and workload according to the Core/Flex organization, first used onboard USS Yorktown (see Appendix A). A Core Team of 45 watchstanders distributed among three sections does routine watchstanding. The Flex Teams for evolutions are comprised of Weapons Flex, Battle Quarters, Flight Quarters, LCAC, Cargo Handling, Damage Control Quarters, Underway Replenishment (UNREP), Boat Operations, Man Overboard, Low Visibility and Mine, and the Snoopy Reconnaissance Teams. [Ref. 18]

Although teams differ in form and function from those of the Yorktown, the flex to action philosophy remains the same. Watchteams focus on watchstanding responsibilities, and the day-workers focus on the routine workload. The

components are flexed to action for special evolutions and emergencies, as required.

In the Vision Statement promulgated in February 1998 [Ref. 24], the Rushmore implemented numerous other policy changes to improve efficiency, including:

1) A nine-section inport duty rotation that ensures all personnel is on the watchbill except CO, XO and CMC. No leave is authorized over duty days, unless an equally qualified standby has agreed to take duty and signs leave chit stating the same.

2) A Life Skills Afloat Training Program that is a cooperative effort with the Family Services Center was implemented to train personnel in financial management, stress/anger management, effective personnel communications, single sailor lifestyles, and other related topics. The program produced a significant reduction in counseling.

3) An Expanded Indoctrination Training policy was established which mandates indoctrination for one month and includes Life Skills Afloat training, completion of initial Personnel Qualification Standards (PQS), and shipboard familiarization.

4) A short form awards processing policy was established. The new policy reduces paperwork and time consumed with the traditional awards process by allowing a single sheet to be filled out.

5) A Corrosion Control Facility has been established as a dedicated workcenter with both staffing and appropriate tools.

6) A thirty-percent Women At Sea integration goal has been established on Rushmore. The standard "Women at Sea" manning is set at ten percent. Rushmore has identified and implemented a scheme allowing up to thirty percent of the crew to be women with only extremely low cost berthing modifications required, promoting a more "normal" atmosphere onboard.

4. Smart Gator Technology

a) Core installations

As a test platform for Smart Gator technologies, the Rushmore's package is centered on a fiber optic Local Area Network (LAN) system that includes five hubs and nine remote computer-operating terminals. The password protected terminals allow access to the Machinery Control System (MCS), the Integrated Bridge System (IBS), the Integrated

Condition Assessment System (ICAS), and the Damage Control Quarters (DCQ). An unclassified administrative network is used for general administrative and supply functions. Windows-based software is used to navigate the various systems and operate equipment, as necessary. [Ref. 20]

b) Engineering for Reduced Maintenance (ERM)

In addition to USS San Antonio based technology, Engineering for Reduced Maintenance initiatives are being evaluated that will effect all ships. This cooperative effort between the fleet and NAVSEA was formally established in April 1996 to coordinate NAVSEA-wide actions required to facilitate ERM efforts. [Ref. 14]

The objectives of ERM are to:

1) Reduce fleet maintenance costs.
2) Prioritize problems by cost and severity of impact to ships and number of effected platforms.
3) Demonstrate on existing ships and systems.
4) Institutionalize corrective actions for future repairs and new construction.

For example, tanks and voids repair and preservation currently represent the number one annual maintenance cost

to the U.S. Navy fleet, at over $244 million. [Ref. 13] However, technology is available to significantly increase the service expectancy of tank coatings. Studies show a one billion dollars cost avoidance over twenty years for Pacific Fleet surface ships and aircraft carriers, for a fifty one to one return on investment. [Ref. 13:p. 8]

The thirteen ERM initiatives focus on bilges, hull maintenance, ventilation ducting, fan rooms and well deck preservation, and are currently being evaluated on various ships throughout the fleet. [Ref. 14] The use of state of the art coating systems combined with good preparation techniques may result in significant reductions in ship's force maintenance.

c) Other installations

The Gator 17 Vision Statement [Ref. 24] provides a detailed synopsis of all technologies installed on the Rushmore. More than twenty different software programs are associated with the core installations. More than fifteen other workload reducing items have been scheduled for installment, with more than sixty others being considered. [Ref. 24]

D. ACTUAL MANPOWER REDUCTIONS

The Rushmore has 345 billets for full manpower requirements. However, 34 of those billets are not funded, resulting in 311 authorized billets. Based on NAVMAC's assessment, battle bill restructuring and technology installations, 42 billets were designated for reduction (see Appendix B). [Ref. 25] However, three quartermaster billets were slated for removal based on the installation of the Electronic Chart Display Information System (ECDIS). Due to insufficient chart coverage, ECDIS has not been approved by NAVSEA for unlimited use aboard Navy vessels. Thus, the three quartermaster billets were reinstated, bringing the total reduction to 39 personnel. [Ref. 25]

IV. THE IMPACT OF THE SMART GATOR PROGRAM ON READINESS

A. INTRODUCTION

1. Background

Measuring readiness for naval vessels has always been extremely complex and dynamic. Readiness factors considered include the number of outstanding Casualty Reports, (CASREPs),[1] the time required to repair a casualty, the level of readiness reported within the Status of Resources and Training System (SORTS),[2] and individual grades on pre-deployment departmental examinations, assessments, and certifications. [Ref. 3]

---

[1] CASREPs are submitted to area commanders reporting degradations in mission capability. Commanding Officers are required to report equipment malfunctions that cannot be corrected within 48 hours and that reduce the ship's ability to perform its mission. CASREPs are rated on a scale of two to four, with four being the most serious degradation to a primary mission area. The percentage of time that a ship is free of equipment problems that critically degrade its ability to perform its mission is akin, in some respects, to a mission-capable rate. [Ref. 27]

[2] SORTS is a system designed to assist the Joint Chiefs of Staff in assessing overall unit readiness. Units report the status of four resource areas (personnel, equipment and supplies on hand, equipment condition, and training). Capability, or "C," ratings on a scale of one to five are assigned to report a unit's readiness. C-1 indicates that a unit can undertake the full wartime missions for which it was organized and designed. C-5 indicates that a unit is undergoing a service-directed resource change and is not prepared to undertake its wartime missions. [Ref. 28]

However, the most traditional indicator that a ship is ready has been a combination of successfully passing pre-deployment inspections, and safely conducting all assignments, including deployments, on time and as designed. Some have argued that too much weight was placed on the former, and not enough on the latter. [Ref. 21]

The Navy's penchant for inspections and checklists came about as a result of numerous safety problems experienced in the 1960's and 1970's. Hundreds of lives were lost and millions of dollars of equipment was damaged on Navy ships due to unsafe operations, poor training, and poor maintenance. [Ref. 21] However, in the early 1970's, the Surface Warfare community established a standardized training program for officer and enlisted watchstanders, and created the Propulsion Examination Board (PEB) to conduct engineering inspections. Due the seriousness of the engineering safety problems, PEB was given significant input in the evaluation of a ship's readiness.

PEB was tasked to conduct the Operational Propulsion Plant Examination (OPPE), which quickly became the most important event on every conventional ship's schedule. [Ref. 21] Many man-hours were consumed in preparation for an

upcoming OPPE. Due to the distressing nature of the inspection process, no captain, junior officer or sailor wanted to ruin a promising career by failing this major exam. [Ref. 21]

Other inspections were also implemented to review all aspects of shipboard life. Administration, training, postal services, weapons handling, and habitability were all covered under separate inspections, or assist visits. Though none was as weighty as OPPE, each was significant enough to warrant countless man-hours during preparation, which detracted from crewmember's quality of life. Consequently, ships looked forward to deployment in order to escape the continuous bombardment of pre-deployment inspections.

2. The need for change

Although there is no substitute for good material readiness, many ships became immune to the inspection process. Experienced officers and chiefs ensured that detailed checklists were used to conduct rehearsals and assist visits, well before the actual inspection. Thus, an inspection became more of a formality than a true assessment of readiness in a given mission area. Until recently, many

inspections and assist visits were redundant, time-consuming and counter-productive. [Ref. 21]

Recognizing the need to improve the Navy's way of doing business, the Chief of Naval Operations implemented a plan to make the Navy more efficient and to improve the quality of life of shipboard personnel. In September 1998, Admiral Johnson released the Navy-wide, Inter-Deployment Training Cycle (IDTC) Reductions message. [Ref. 26] His primary goal was to reduce the workload of the operating forces. Through cancellations and consolidations, the Surface Navy reduced the number of inspections from over 140 to fewer than 20, with additional consolidations still being reviewed. [Refs. 21,26] Although PEB still exists and conducts engineering certifications, the emphasis is now on enhancing readiness, as opposed to demanding it.

This action will potentially have an enormous impact on the fleet. Not only could it reduce the workload, but it may also change Navy culture. The Engineering Certification is still the primary inspection for conventionally powered ships; however, the most realistic measure of a ship's readiness remains the ability to safely and successfully complete deployment. [Ref. 21]

3. Rushmore's Progress

The USS Rushmore is currently in the training and workup phase while preparing for her June 1999 deployment to the Western Pacific Ocean. However, at the time of this study, the ship's most significant inspection was the E-Cert conducted by the Pacific Fleet Propulsion Examining Board in October 1998. [Ref. 17] For the purposes of this research, the E-Cert report [Ref. 24], questionnaire answers, observations, interview results, and all other pertinent data will be used to determine the current impact of the Smart Gator Program on the Rushmore's readiness.

4. Chapter overview

This chapter answers the question whether the Smart Gator Program has impacted the mission readiness of the USS Rushmore. Section B reviews the results of the Rushmore's E-Cert [Ref. 24], which also provides a measure of readiness. Section C summarizes the results of the interviews and questionnaires. Section D summarizes the findings of this research, and indicates the advantages and disadvantages of the Smart Gator Program.

B. RUSHMORE'S ENGINEERING CERTIFICATION RESULTS

In October 1998, CINCPACFLT PEB certified the USS Rushmore for unrestricted operations and integrated training. [Ref. 24] However, numerous technical problems were experienced with Smart Gator related systems, such as inadvertent alarms and system shutdowns. [Refs. 17, 24] High priority material discrepancies for the Machinery Control System included the starboard main reduction gear lube oil strainer pressure differential and the port controllable pitch propeller auxiliary oil pressures were too high. Also, the main reduction gear lube oil header pressure and most remote bearing sensors produced spurious alarms. Alarms on these systems warrant immediate action that may affect the ship's maneuverability and combat effectiveness. Reliability and supportability of newly installed equipment remain an issue. [Ref. 11,17]

C. INTERVIEW AND QUESTIONNAIRE RESULTS

In order to identify the full measure of the Smart Gator Program, it was necessary to interview personnel of the Rushmore, and the staff of Amphibious Group Three (PHIBGRU Three). Additionally, relevant questions were asked to COMNAVSURFPAC, Vice Admiral Edward Moore, during a brief

to the Monterey Bay Chapter of the Surface Navy Association in November 1998. [Ref. 21] The staff of SURFPAC is responsible for the maintenance and operation of all surface ships in the Pacific Fleet. PHIBGRU Three is responsible for the maintenance and operation of the U.S. mainland-based, Pacific Fleet amphibious ships, including the USS Rushmore.

Appendix C lists twenty baseline questions that were asked during formal interviews of key members of the Smart Gator Program in July 1998. Although some of the questions are not directly relevant to this study, they provide a framework for assessing the overall Smart Ship Concept.

Rushmore personnel formally interviewed include the Commanding Officer, Executive Officer, Personnel Officer, and Electronics Division Leading Chief Petty Officer. Additionally, informal interviews consisting of spontaneous questions were conducted with other enlisted and officer watchstanders during research. Interviews were not limited to the questions listed.

PHIBGRU Three personnel formally interviewed include the Group Commander and the Group Material Officer, who also serves as the Smart Gator Progam Manager. Additionally, Commander, Naval Surface Force, Pacific Fleet, Vice Admiral

Edward Moore, was informally interviewed following a brief conducted in November 1998 at Naval Postgraduate School [Ref. 21]

1. Rushmore concerns

Overall, USS Rushmore personnel were enthusiastic about the potential benefits of the technology. However, most of the ship's senior leadership expressed major concerns about the implementation of the Smart Gator Program. The most significant issues raised during the interviews were as follows. Manpower was reduced prior to the actual installation of supporting Smart Gator Technology, and crew training on the core installation was limited. Although company representatives provided initial training on the new equipment, minimal logistics support was available. Technical documentation and associated operating manuals were not available to use on a daily basis. Thus, crewmembers received "on the job training," and were forced to develop their own qualification requirements for the Smart Gator installations. Equipment reliability remains an issue, until the installations can be fully evaluated in an operational environment. Additionally, a lack of parts

support and technical manuals made the ship dependent upon contractors to fix all problems.

Most importantly, the crewmembers' workload increased dramatically due to the increase in training hours and decreases in manning, which impacted other aspects of the crew's workload.

The most noticeable area affected was the ship's material readiness and maintenance. The reduction of manpower and the increase in training time contributed significantly to increasing each sailor's workload as described in Chapter III. Consequently, during an April pre-underway assessment, the Rushmore was deemed not ready to commence the training cycle due to poor material readiness. [Refs. 11,17,18] However, the E-Cert Report, completed in October, indicates that Rushmore has returned to a high state of material readiness. [Ref. 24]

2. SURFPAC and PHIBGRU THREE issues

The majority of the staff members were enthusiastic about the entire program. However, concerns were expressed about equipment supportability and warranty items. [Ref. 11] The initial costs of installation and testing are higher than expected. Thus, since COMNAVSURFPAC is funding the

entire program out-of-pocket, the Phase II installation has been halted until further assessment of the Smart Gator core installation benefits and savings. [Ref. 21]

In the meantime, the USS Rushmore will continue her pre-deployment training cycle with the Core Installations and other ERM initiatives onboard, thus providing an opportunity for future studies.

D. SUMMARY

Based on the E-Cert report [Ref. 24], questionnaire answers, observations, interview results, and other pertinent data, the Rushmore's mission readiness has been impacted. Initially, the combination of increased workload and reduced manning decreased material readiness, as the crew adjusted to newly installed systems. However, the officers and crew were able to adapt to the changes and pass the demanding E-Cert. The most noticeable advantages and disadvantages of the Smart Gator Program are listed below.

1. Advantages of Smart Gator

The primary advantages of the Smart Gator Program are as follows. Command and control of the ship's functions are improved. Watchstanders have an increased ability to monitor shipboard operations due to the technology of the

Integrated Condition Assessment, Integrated Bridge, and Machinery Control Systems.

Less time is wasted on routine tasks, like logkeeping and taking temperature readings. ICAS and MCS provide constant updates of all necessary systems. Additionally, the Commanding Officer and Chief Engineer can review logs from computer terminals, as opposed to reading numerous log records. Improved technology also allows remote operation of the majority of engineering plant equipment.

The HYDRA II wireless communication system allows full communication throughout the ship. The combination of the HYDRA II and the DCQ system allows significant manpower reduction during high combat readiness conditions. Fewer phone talkers and plotters are needed for damage control situations, thus reducing overall manning.

2. Disadvantages

The primary disadvantages include a lack of logistics support (e.g., parts, manuals, warrantees, etc.) and inadequate training provided for crewmembers. Also, poor implementation procedures, like removing personnel prior to installation and testing of supporting technology, created a higher workload for the crewmembers. Finally, unreliable

and untested equipment contributed to a higher than expected initial cost which impacted SURFPAC's ability to fund Phase II installations.

However, the overall effectiveness of the Smart Gator Program can not be fully addressed until after the Rushmore's deployment in June 1999.

V. CONCLUSIONS AND RECOMMENDATIONS

A. EXECUTIVE SUMMARY

Commanding Officers have always sought ways to operate their ships more efficiently in order to enhance mission readiness and reduce workload. The Smart Gator Program concepts and technology provide potential answers for Commanding Officers. The use of technology to conduct mundane, time-consuming tasks, like logkeeping and taking temperature readings, releases watchstanders from duties which can be performed better by a computer.

Although many other sea-going organizations have used computer technology to operate and monitor their vessels for years, the tradition and culture of the U.S. Navy has often stifled attempts to do the same. The practice of manning ships in order to provide redundancy at every watchstation has proven to be effective over the Navy's history. However, reduced military budgets, increasing manpower costs, and leading edge technology, have combined to encourage the Navy to look into methods of reduce manning, like Smart Gator. However, the effective implementation of Smart Gator can only be realized by proving that the benefits of

implementing the concepts, and installing high technology equipment, outweigh the costs of the program.

However, in order for a fair assessment of any new concept or technology, the implementation process must be above reproach. If a system is designed to reduce manpower, it stands to reason that the system must be installed, and fully tested, in order to determine its total impact on shipboard operations. Implementation in any other manner is unfair to the concept, and more importantly, to the crew.

The addition of any new equipment requires substantial training for those who operate and maintain the ship. As indicated in Chapter III, training and overall maintenance comprise a large portion of a sailor's workload, at almost 40 percent by some estimates. The installation and testing of new equipment of this magnitude, while simultaneously working up for deployment, seems counterproductive, at best. However, it is the ship's crew that suffers most when the workload is increased. More than likely, the ship and its crew will continue to complete any task assigned, in spite of the increased workload.

Another significant issue is funding. Although the Core/Flex organization provides manpower savings that can be

implemented on any ship, certain billets, like phone talker, cannot be reduced without the Core Installation equipment. Research and Development funds must be dedicated to this effort at a level much higher than the type commander (SURFPAC) is able to provide. As a result of insufficient funding, the Navy may never know the optimum number of personnel required to man a ship, or if the Smart Gator Program is cost effective. Also, if using the Rushmore as a test platform for the USS San Antonio technology is not properly funded to support complete test and evaluation, the Navy may never determine if the Smart Gator Program is cost effective.

The implementation of the Smart Gator Program during the pre-deployment cycle had a negative impact on the readiness of the Rushmore. However, given time to operationally test the installations and to train the crew, the Rushmore may regain maximum readiness prior to deployment. With careful planning, the Smart Gator Program may have a profoundly positive effect on all amphibious ships.

B. CONCLUSIONS

This scope of this research effort supports the Smart Gator Program. The findings have led to the following conclusions concerning the impact of the Smart Gator Program on the mission readiness of the USS Rushmore:

1) NAVMAC Analysis. The initial man-hour assessment conducted by NAVMAC did not cover the crewmember's full workload. Only the operational manning portion was considered, which constitutes 25 percent. Thus, the projected billets saved and return on investments were probably better than they would be if all components were considered.
2) Funding. Insufficient funding of the program has led to a temporary stoppage of equipment installations.
3) Supportability. The reliability and supportability of the equipment was considered unreasonably low. Technical documentation and logistics support should have been included as part of the initial package. The non-availability of technical documentation also prevents the ship's crew from

troubleshooting minor problems and costs the Navy for additional visits by contractors.

4) Smart Gator Program assessment. The implementation of the Smart Gator Program during the pre-deployment workup cycle, in conjunction with the premature reduction of manpower, initially produced a negative impact on the Rushmore's mission readiness.

C. RECOMMENDATIONS

Based on the conclusions of this research, the following recommendations are made:

1) NAVMAC Analysis. A complete NAVMAC analysis should be conducted, taking into account all facets of shipboard personnel workload. Return on investments can then be recalculated.

2) Funding. Navy research and development funds must be dedicated to this effort in order to obtain a fair assessment. Financial support must be provided from levels higher than that of the type commander. Navy Research and Development funds should be dedicated to this effort.

3) Supportability. Parts and technical support must be provided. The ship must have the capability to fully train with the new equipment, and maintain and conduct repairs as necessary.

4) Smart Gator Program assessment. Similar to the Yorktown's effort, the Operational Test and Evaluation Force must conduct an operational assessment of the USS Rushmore in the Projected Operating Environment. A post-deployment assessment will help determine the full effectiveness of the program.

D. FUTURE AREAS OF RESEARCH

This thesis evaluated the impact of the Smart Gator Program on the mission readiness of the USS Rushmore. Since readiness is a multi-faceted moving target that can best be evaluated following a ship's deployment, the scope of this study was limited. However, the issues surrounding this complex topic present a myriad of opportunities for future study. The following areas are recommended for further research:

1) Conduct an assessment of the impact of Smart Gator Technology on mission readiness following deployment.
2) Conduct a cost-benefit analysis of Smart Gator using the proposed NAVMAC analysis.
3) Conduct an optimal manning analysis of Smart Gator to determine the optimal number of personnel required to operate and fight Smart Gator.
4) Analyze Smart Gator equipment reliability rates following deployment. Also, review the impact of sustainability issues (e.g., impact on manhours, impact on mission readiness, cost of repairs, etc.).

APPENDIX A

USS RUSHMORE (LSD 47) CORE/FLEX ORGANIZATION

CORE (3 SECTIONS)					
Bridge	OOD	CIC	CICWO	RADIO	SUPVR
	QM/SM/BMOW		CIC SUPVR		SYS OPR
	AFT L/O		ARPA OPR		
			SLQ 32 OPR		
ENG	EOOW/DCC				
	PCCO				
	EPCC				
	PORT ROVER				
	STBD ROVER				
	Oil King/S&S				
TOTAL PERSONNEL: 45					

NOTE: ALL FLEX TEAMS LISTED BELOW ARE SUPPLEMENTS TO THE CORE TEAM

WEPS FLEX (2 SECTIONS)			
CIC	TAO	GUNS	MT 51
	GLO		MT 52
	RCP		MT 22
	SPS 49 OPR		MT 23
TOTAL PERSONNEL: 24			

BATTLE QUARTERS					
CIC	DRT	GUNS	LCP/MT PREP	RADIO	CWO
	CIC NAV PLOT				TTY
	EW SUPVR				OUTROUTER
	VERT PLOT				
	SURF PLOT			SIGS	SIG SPOTTER
	SURF SUPVR				SIG RECORDER
	LAAWC				
REPAIR 8	RPR 8 L/L				
	CIC TECH				
	RADIO TECH				
	RADAR TECH				
	RPR 8 INV				
TOTAL PERSONNEL: 20					

NOTE: BATTLE QUARTERS, WEAPONS FLEX AND DC QUARTERS ARE COMPLETELY
EVOLUTIONS, AND ONLY THE SPECIFIC TEAM CALLED AWAY WILL RESPOND.
ALL GUN MOUNT PERSONNEL WILL MUSTER, AND PERSONNEL NOT ACTUALLY
GUN MOUNT WILL BE LOADERS FOR CHAFF AND CIWS.

FLIGHT QUARTERS (WHITE TEAM)	
HCO	NR 1 T/L
FDSO	NR 2 T/L
LSE	NR 1 HOSE
JP5	NR 2 HOSE
S/L	PROX SUIT
CORPSMAN	ASST LL/DCTT
TOTAL PERSONNEL: 23	

NOTE: ALL FOUR LSE'S AND ALL FOUR JP5 FUEL PERSONNEL WILL BE CROSS-TRAINED TO CHOCK AND CHAIN. THE BACK UP FIRE PARTY WILL CONSIST OF THE LSE'S NOT BEING USED AND THE JP5 FUEL PERSONNEL.

WHEN CONDUCTING TWO SPOT OPS, THE CHOCK AND CHAIN PERSONNEL WILL BE FOUR OF THE STRETCHER BEARERS

WHEN WHITE TEAM IS USED FOR DC, THE FOLLOWING APPLIES:

WHITE L/L	
WHITE S/L	DURING FLT QTRS, WHITE TEAM CANNOT BE USED FOR DC
WHITE T/L	
WHITE INV	

LCAC:			
BRIDGE	DEBARK CTRL	CIC	EVAL
			PLOTTER
			BOAT A CTRL
			BOAT B
WELLDEC	WELLDECK CTRL		
	BALLAST CTRL OFF		
	STBD SAFETY		
	ELECTRICIAN		
	SM/STERNGATE		
	RAMP MARSHALL		
TOTAL: 12			

NOTE: FUELING PERSONNEL ALSO FUEL HELOS, THEREFORE THE ONLY DELAY TO CONDUCTING CONCURRENT FLIGHT OPS AND LCAC OPS IS CONCURRENT REFUELING

CARGO HANDLING:			
CRANE	SAFETY	ROLLING STOCK	SAFETY
	CRANE OPR		FORKLIFT OPR
	POIC		MONORAIL
	LINE HANDLERS		TRAFFIC DIR
TOTAL: 15			

NOTE: The cargo handling positions are supplements to the LCAC, LCU/LCM or AAV evolutions.

DAMAGE CONTROL QUARTERS		
DCA	RED L/L	BLUE L/L
R/R	RED S/L	BLUE S/L
CRT	RED T/L	BLUE T/L
	RED HOSE	BLUE HOSE
	ISOLATION	BATTLE MESSING
	AFFF OP	STRETCHER BRS
	INVESTIGATOR	BDS
		PART ISSUE
		MED
		DEN
		INVESTIGAOR
TOTAL: 101		

NOTE: ELECTRICIANS ARE FROM R/R AMD CRT RESPONDS ONLY WHEN INDIVIDUALLY CALLED AWAY.

TOTAL PERSONNEL: 240

UNREP		
MASTER HELM	FLAGBAG OPR	RIGGER
LEE HELM	SIG MSGR/REC	LINE HANDLER
L/O	SIG LOG KEEPER	FUEL SAMPLER
AFT STRG	SAFETY RIG CAPTAIN	CORPSMAN
CSE/SPD REC	STAT SIG	PDL SAFETY
HELM SAFETY	GUNNER	PDL GUNNER
	STA/STA P/T	PDL HANDLER
	TEMP LIFELINE	
TOTAL: 80		

BOAT OPS		
SAFETY	POIC	WINCH OP
BOAT OFF	LN PO	WINCH CHECK
COXSWAIN	FWD BLK LN	SEA PAINTER
BOW HOOK ENG	AFT BLK LN	LIZZARD LN
	FWD STDY LN	AFT STDY LN
TOTAL: 23		

MAN OVBD	
SAFETY	POIC
CORPSMAN	FWD, AFT VANG
SAR	RIGGER
GUNNER	INHAUL
	TEND LN
	TEMP LIFELN
TOTAL: 22	

L/V&MINE	
FWD L/O	**TOTAL: 3**
FWD S/P	
AFT L/O	

SNOOPY	
PHOTO	**TOTAL: 5**
DATA	

APPENDIX B

USS RUSHMORE (LSD 47) MANPOWER STATUS
AS OF 07 JULY 1998

RATE	NMP	BA	COB	ACOB	Reduction Plan
BM	19	20	17	17	2
DC	12	13	11	10	2
DK	2	2	2	2	
DT	3	3	3	3	
EM	12	11	10	9	
EN	48	44	43	43	8
ET	10	10	10	9	Add 3 ET's
EW	4	4	4	4	
FC	4	5	4	5	
FN(M)	15	19	13	9	6
FN	5	NA	7	8	
GM	4	4	6	6	
HM	7	7	7	7	1
HT	8	7	6	7	1
IC	6	6	6	8	1
JO	1	1	1	1	
MA	1	1	1	1	
MM	3	3	4	4	1
MR	1	1	1	1	
MS	16	18	19	16	1
NC	1	1	1	1	
OS	15	16	14	15	
PC	1	1	2	1	
PN	3	4	4	4	
QM	5	6	5	5	3
RM	13	13	11	11	3
SH	6	7	8	8	
SK	8	9	11	11	
SM	6	8	6	5	4
SN(M)	15	39	17	17	8
SN(F)	18	NA	25	25	
YN	4	5	6	5	1
3MC	1	1	1	1	
CMC	1	1	1	1	
TOTAL	278	290	286	280	42-3=39

NMP - NAVY MANNING PLAN
BA - BILLETS AUTHORIZED (FUNDED)
COB - CURRENT ON BOARD
ACOB - ACTUAL CURRENT ON BOARD

APPENDIX C - Smart Gator Questionnaire

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22 Jul 98

Thesis title –*Smart Gator: An Analysis of the Impact of Reduced Manning on U.S. Naval Amphibious Ships*

Smart Gator Questionnaire

Note: The questions and answers contained in this questionnaire are strictly for thesis research purposes. Please answer them to the best of your ability. Several questions request supporting documentation, if available (**boldface questions**). This interview may be recorded to enhance the quality of the research. Thank you.

1. In your own words, what is the mission statement of the Smart Ship Concept?

2. What is the Navy's intention with the Smart Ship Program? Full/Partial implementation? Experimental?

3. **How was USS Rushmore (LSD-47) chosen for the CNSP Smart Ship platform? When was the program initiated on the USS Rushmore**?

4. Does the wide array of auxiliary equipment and the diesel propulsion system on USS Rushmore enhance the technical implementation of Smart Ship, or hinder it?

5. Does the design of the USS Rushmore enhance organizational changes, or hinder them (e.g., Damage Control, Sea & Anchor, etc)?

6. **How many initiatives have been implemented on the USS Rushmore? Is implementation complete**?

7. **What changes have been made to the manning requirements of the USS Rushmore? Where are the most significant manpower savings?**

8. What methods are most effective in training crewmembers on the operation and maintenance of the new equipment?

9. What has been the most difficult aspect of implementation?

10. **What are some other problems or concerns with the Smart Ship initiative? What has been done to correct these problems?**

11. **Specifically, what are the ship's organization and watchbill changes?**

12. Is the Smart Ship organization more efficient? Is it more effective?

13. **How has the mission readiness and capabilities been affected?**

14. **How has the PMS program been altered to enhance reduced manning?**

15. **Is the USS Rushmore scheduled to deploy soon?**

16. Does the diversity and inherent danger of amphibious operations make manpower reductions less desirable than on a cruiser or destroyer?

17. How has the Smart Ship initiative affected shipboard morale?

18. **Has quality of life improved? Have working hours been affected**?

19. **How do you plan to assess the success of the program? What criteria will you use**?

20. **When will your assessment report be submitted**?

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[1] In 1996, the current Gator-17 Program was unofficially known as the Gator-21, as in 21st Century amphibious ship. The number was later changed from 21 to 17, thus representing ties to the forthcoming USS San Antonio (LPD-17). The phrase "battle bill scrub" refers to a detailed analysis of a ship's battle bill in order to determine the maximum number of billets that can eliminated through Smart Ship technology, policy changes and organizational restructuring.

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